Regional Stratification and Shear of the Various Streams Feeding the Philippine Straits – ESR Component

Amy Ffield
Earth & Space Research, 290 Clausland Mountain Road, Upper Grandview, NY 10960-4113
phone: (845) 353-1733 fax: (845) 353-1733 email: ffield@esr.org

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http://www.esr.org

LONG-TERM GOALS

To determine the impact of the regional oceanographic and atmospheric mean and variable conditions on the Philippine Archipelago strait dynamics.

OBJECTIVES

To quantify the monsoonal and interannual oceanographic stratification and shear boundary conditions in the Philippine Archipelago region.

APPROACH

Regional CTD and Lowered ADCP [CTD/LADCP] study in cooperation with Arnold Gordon (Lamont-Doherty Earth Observatory).

WORK COMPLETED

Background data analysis on the Philippine Archipelago region has been completed in preparation for the field experiment. (At the time of writing this report the P.I. has not yet received funds for the project.)

RESULTS

Sea Surface Temperature: Analysis of the OI Infrared Satellite SST reveals that the SST in the Philippine Archipelago region has significant variability (Figure 1). This variability may be mirrored in the deeper ocean possibly impacting strait dynamics. For example, in 1987 the annual range in SST is quite large: ~4.5°C, but in 1988 the annual SST range is only ~1.5°C (***Figure 2***); these SST differences may reflect quite different sub-surface ocean stratifications that could impact strait dynamics.

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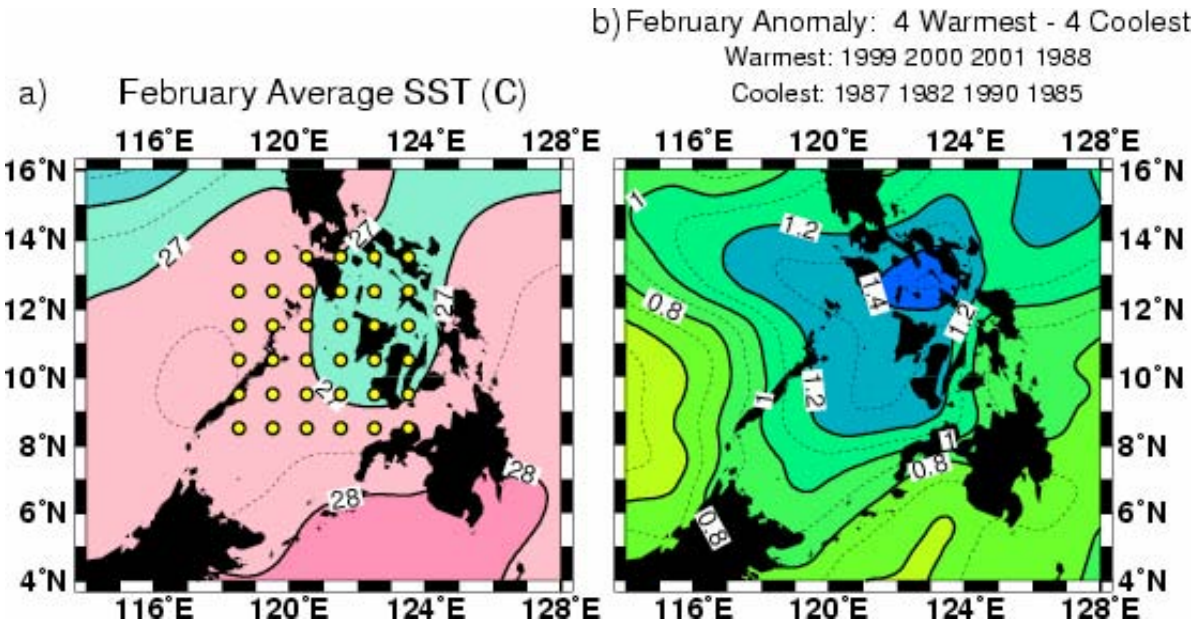

Figure 1. The average February SST (a) and the interannual SST contrasts between the warmest and coolest Februarys (b) in the Philippine region.

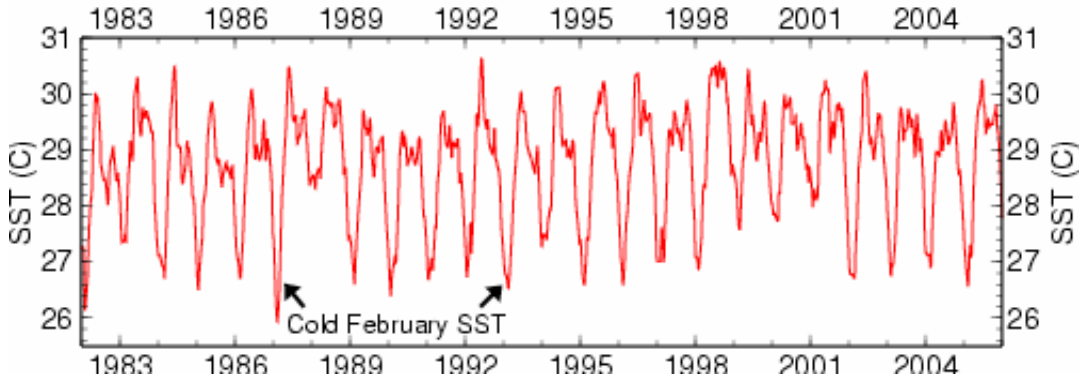

Figure 2. SST time series for the Mindoro Strait / northern Sulu Sea region in the Philippine Archipelago.

Sea Level/Tide Gauges: Multiple sea level/tide gauges are in operation in the Philippine Archipelago region (***Figure 3***). The gauges capture the tidal variability (***Figure 4***), as well as significant mean sea level height differences across the basins (***Figure 5***) that can be used to characterize the background conditions impacting strait dynamics.

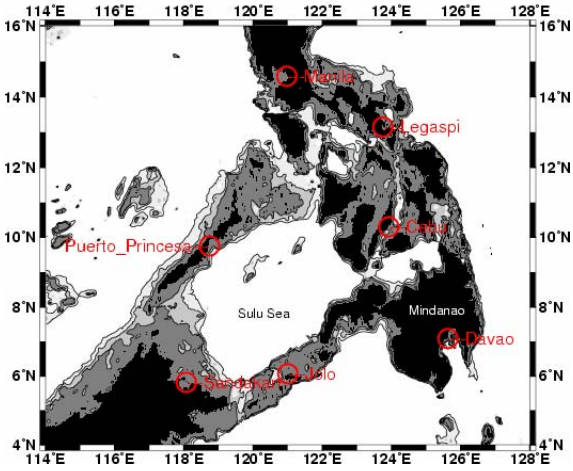

Figure 3. Map of the sea level height station locations in the Philippine Archipelago region. Data may not be available from the gauges at Jolo and Puerto Princesa at the time of the field experiment.

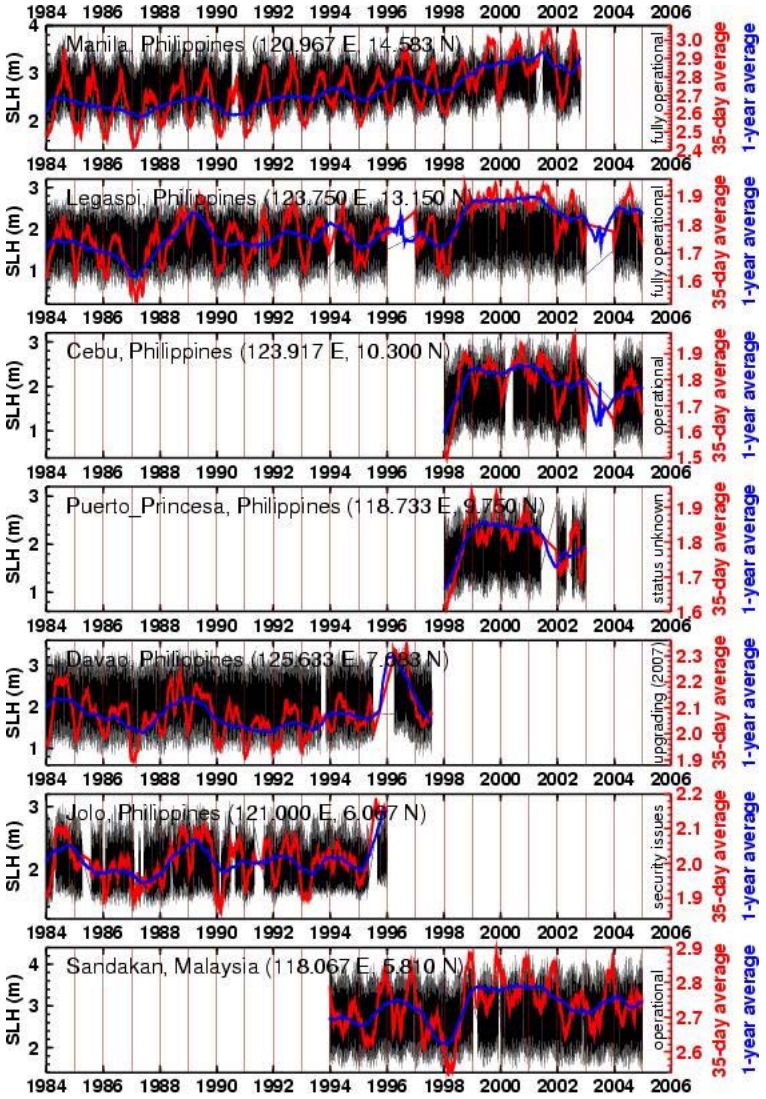

Figure 4. Sea level height time series for the gauges in the Philippine Archipelago region.

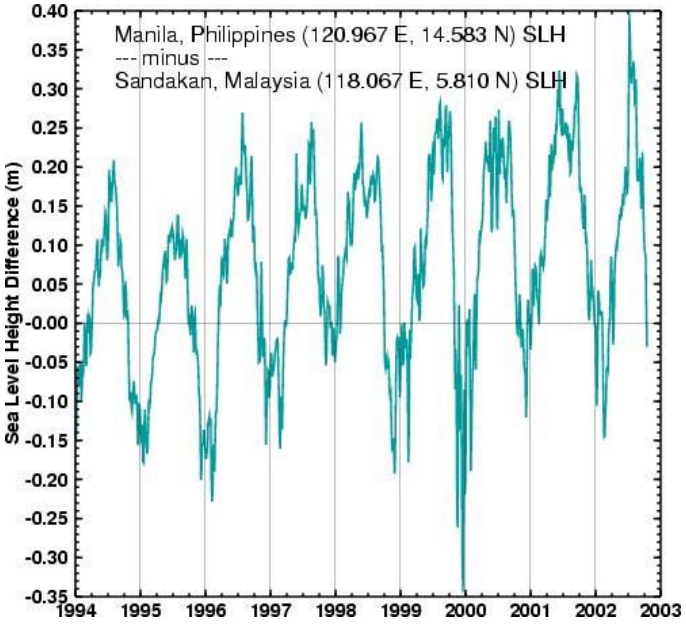

Figure 5. Sea level height difference between the Manila and Sandakan tide gauges, potentially representing the variability in the cross-channel sea level height difference of Mindoro Strait.

Barotropic Tides: The altimeter-derived barotropic modeled tide heights on either side of the Mindoro Strait (***Figure 6***) reveal spring tide ranges as large as 2 m (***Figure 7***). The difference in the barotropic tides across the straits may also be important to strait dynamics; in this case, the predicted barotropic tide height difference across the Mindoro Strait varies from as low as 0.02 m during neap tides up to 0.25 m during spring tides (***Figure 8***).

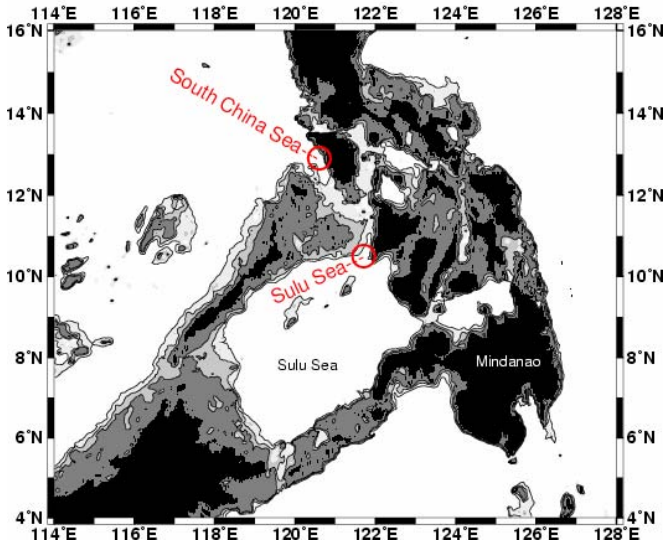

Figure 6. Map of the predicted barotropic tide height locations on either side of Mindoro Strait.

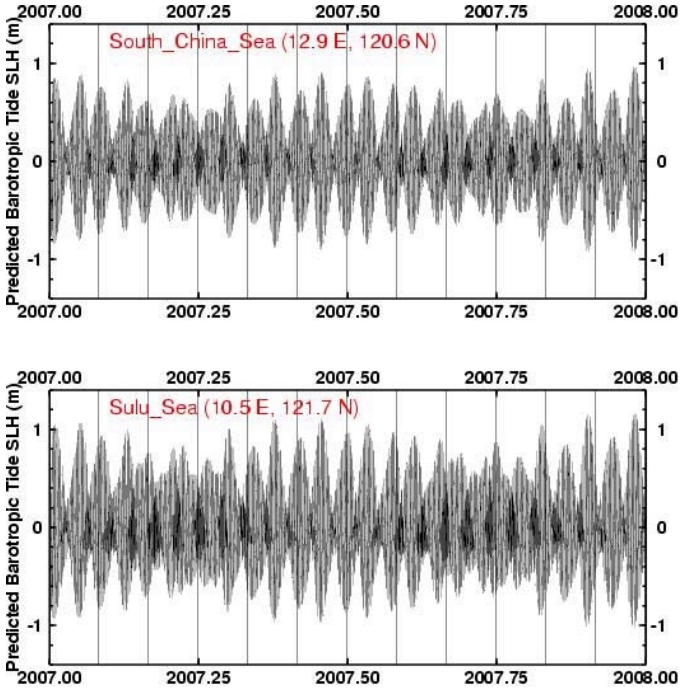

Figure 7. Time series of the predicted barotropic tide heights on either side of Mindoro Strait.

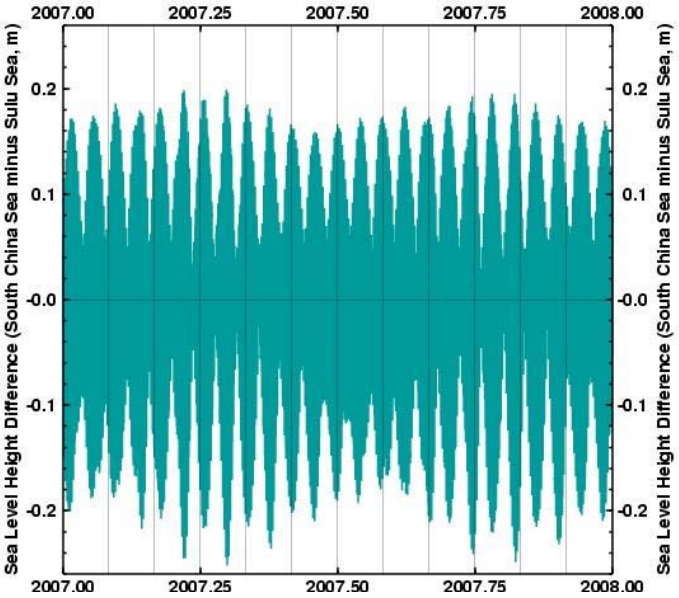

Figure 8. Time series of the difference in predicted barotropic tide height across Mindoro Strait.

IMPACT/APPLICATIONS

The preparatory analysis will aid in the final design of the field experiment.